Code No: R10202/R10 **Set No. 1**

I B.Tech II Semester Supplementary Examinations, Feb/Mar 2014
MATHEMATICS- II
(Common to Civil Engineering, Electrical & Electronics Engineering, Mechanical Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Chemical Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Computer Engineering, Aeronautical Engineering, Bio-Technology, Automobile Engineering, Mining and Petroliem Technology)

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Find L(t e^{2t} sin3t)
   (b) Find L$\left(\frac{\sin t}{t}\right)$ [7+8]
2. (a) Find $L^{-1}\left[\frac{s-3}{s^2-10s+29}\right]$.
   (b) Find $L^{-1}\left[\log\left(\frac{s^2+4}{s^2+9}\right)\right]$. [7+8]
3. Find the fouries series for the function

   $f(x) = -\pi$, $-\pi < x < 0$
   $= \pi$, $0 < x < \pi$ and hence deduce the series $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + ... = \frac{\pi^2}{8}$ [15]
4. (a) Find the fourier transform of f(x) defined by f(x)=e^{iax}, α <x<β,f(x) =0, x< α and x> β
   (b) Find the fourier transform of f(x) defined by f(x) = $e^{-x2/2}$, -8 < x< 8. [8+7]
5. (a) Form the Partial Differential Equation by eliminating arbitrary functions from z = y f(x) + x g (y)
   (b) Solve p+q=1 [8+7]
6. An insulated rod of length l has its ends A and B maintained at 0^oC and 100^oC respectively until steady state conditions prevail. If the ends A and B are changed to 40^oC and 60^oC and maintained at these values, find the transient distribution of the rod. [15]
7. (a) Find $Z^{-1}\left(\frac{2z^2+3z}{(z+2)(z-4)}\right)$
   (b) Find the inverse Z-transform of $\frac{5z}{(2-z)(3z-1)}$. [8+7]
8. (a) Prove that$\beta(m,n) = a^m b^n \int_0^\infty \frac{x^{m-1}}{(ax+b)^{m+n}} dx$, where a,b >0.
   (b) Express $\int_0^1 \frac{1}{(1-x^3)^{1/3}} dx$ in terms of gamma functions. [8+7]

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Code No: R10202/R10 **Set No. 2**

I B.Tech II Semester Supplementary Examinations, Feb/Mar 2014
MATHEMATICS- II
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Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Find the Laplace transform of e^{5t} + e^{-2t} - sin5t + cos4t - sinh2t + 5 cosh3t + t^5 - 9
   (b) Find the Laplace transform of t^2sin2t [7+8]
2. (a) Find inverse Laplace transform of $\frac{4s+5}{(s-1)^2(s-2)}$
   (b) Find inverse Laplace transform of $\frac{1}{s(s+3)^3}$ [7+8]
3. Obtain the half range cosine and sine series for f(x)=x in o<x<L [15]
4. Find the fourier sine transform of f(x)= $\frac{1}{x(x^2+a^2}$ [15]
5. (a) Solve p-q=z-y
   (b) Solve (x-a)p + (y-b) q = z-c [8+7]
6. (a) Solve $3u_x+2u_y=0$ and $u(x,o) = 4e^{-x}$ by the Method of Separation of Variables.
   (b) Solve $\frac{d^2z}{dx^2} - 2\frac{dz}{dx} + \frac{dz}{dy} = 0$ by the Method of Separation of Variables. [8+7]
7. (a) Find $Z^{-1}\left(\frac{3z^2+z}{(5z-1)(5z+2)}\right)$.
   (b) Find $Z^{-1}\left(\frac{z^2-3z}{(z+2)(z-5)}\right)$ [8+7]
8. (a) Prove that$\beta(m,n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$.
   (b) Express $\int_0^{\pi/2} \sqrt{\tan\theta}d\theta$ in terms of gamma functions. [8+7]

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Code No: R10202/R10 **Set No. 3**

I B.Tech II Semester Supplementary Examinations, Feb/Mar 2014
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Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Find the Laplace transform of t sin2t cos2t
   (b) Find $L\left(t^2 \cos 2t\right)$ [7+8]

2. (a) Find $L^{-1}[e^{-2s}/(s^2+4s+5)]$.
   (b) Find$L^{-1}\left[\log\left(\frac{s+1}{s-1}\right)\right]$. [7+8]

3. Find the fourier series for f(x)=2Lx-x^2 in 0<x<2L and hence deduce 1-$1/2^2$+$1/3^2$-$1/4^2$+....=$\pi^2/12$ [15]

4. Find the fourier sine transform of $f(x) = \begin{cases} 1-x^2, & |z|<1 \\ 0 & |z|>1 \end{cases}$ [15]

5. (a) Form the Partial Differential Equation by eliminating arbitrary function from f (x^2+y^2, z-xy) =0
   (b) Solve pq=xy [8+7]

6. A tightly stretched string of length l with fixed end points is initially at rest in its equilibrium position and each of its points is given a velocity v(x) such that $v(x) = \begin{cases} cx, & 0 \le x \le \frac{l}{2} \\ c(l-x), & \frac{l}{2} \le x \le l \end{cases}$ find the displacement of any point on the string at any time 't'. [15]

7. (a) Find the Z-transforms of (i) $e^{-an}\sin n\theta$ (ii)$3n^2 + 10\cos\left(\frac{n\pi}{2}\right) + a^{n+2}$.
   (b) Find the Z-transforms of (i) $(n-1)^2$ (ii) $5e^{-an}\sin\left(\frac{n\pi}{4}\right) - 3a^4$. [8+7]

8. (a) Show that $\int_0^\infty e^{-x^2}dx = \frac{\sqrt{\pi}}{2}$
   (b) Prove that $\beta(m+1,n) + \beta(m,n+1) = \beta(m,n)$ [8+7]

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Code No: R10202/R10 **Set No. 4**

I B.Tech II Semester Supplementary Examinations, Feb/Mar 2014
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Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Find the Laplace transform of cos3t sin5t
   (b) Find the Laplace transform of $\frac{1-e^{-t}}{t}$ [7+8]
2. (a) Find $L^{-1}[(2s+3)/(s^3-6s^2+11s-6)]$.
   (b) Find $L^{-1}\{\cot^{-1} s\}$. [7+8]
3. $f(x) = kx, \quad for\ 0 < x < \frac{\pi}{2}$

   $k(\pi - x), \quad for\ \frac{\pi}{2} < x < \pi$ find the half range sine series [15]
4. (a) Find the inverse fourier cosine transform of f(x) of $F_c(p) = 1/2a(a-p/2)$ when $p<2a$, $F_c(p) = 0$ when $p=2a$
   (b) Find the fourier cosine transform of $f(x) = e^{-ax}\cos ax$ [8+7]
5. (a) Form the Partial Differential Equation by eliminating arbitrary function from f(x+z, y+z) =0.
   (b) Solve $x(y^2-z^2)p + y(z^2-x^2)q = z(x^2-y^2)$ [8+7]
6. Solve $\frac{\partial^2 u}{\partial t^2} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$, $-\alpha < x < \alpha, t \geq 0$ with conditions u(x, 0) = f(x) and $\left(\frac{\partial u}{\partial t}\right)_{(x,o)} = g(x)$ assuming u, $\frac{\partial u}{\partial t} \to 0$ as$x \to \alpha$. [15]
7. (a) Find the inverse Z-transform of $\frac{z}{(z-1)(z-2)}$
   (b) Determine u_2 where $U(z) = \frac{2z^2+3z+4}{(z-3)^3}$, $|z| > 3$ [8+7]
8. (a) Show that $\int_{-1}^{1}(1+x)^{m-1}(1-x)^{n-1}dx = 2^{m+n-1}\beta(m,n)$
   (b) Show that $\int_0^\infty \frac{x^n}{n^x}dx = \frac{\Gamma(n+1)}{(\log n)^{n+1}}$, $n > 1$ [8+7]

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